



BACKGROUNDREPORT  
ON  
UTILITIES AND INFRASTRUCTURE

**A Report to the Delta Protection Commission**

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ON  
UTILITIES AND INFRASTRUCTURE

Prepared by  
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## INTRODUCTION

The Delta Protection Commission is charged with preparation of a land use and resource management plan for the Delta (see Figure 1). The Plan is to be adopted by the Commission and forwarded to the five Delta Counties for adoption and implementation through the existing regulatory process.

The Counties regulate land use through the General Plan and Zoning Ordinance, and through day to day review of proposed projects. State and federal projects are reviewed through the environmental review process. By commenting on the environmental impacts of proposed projects, the Counties can attempt to ensure that the County plans and goals are implemented by all projects.

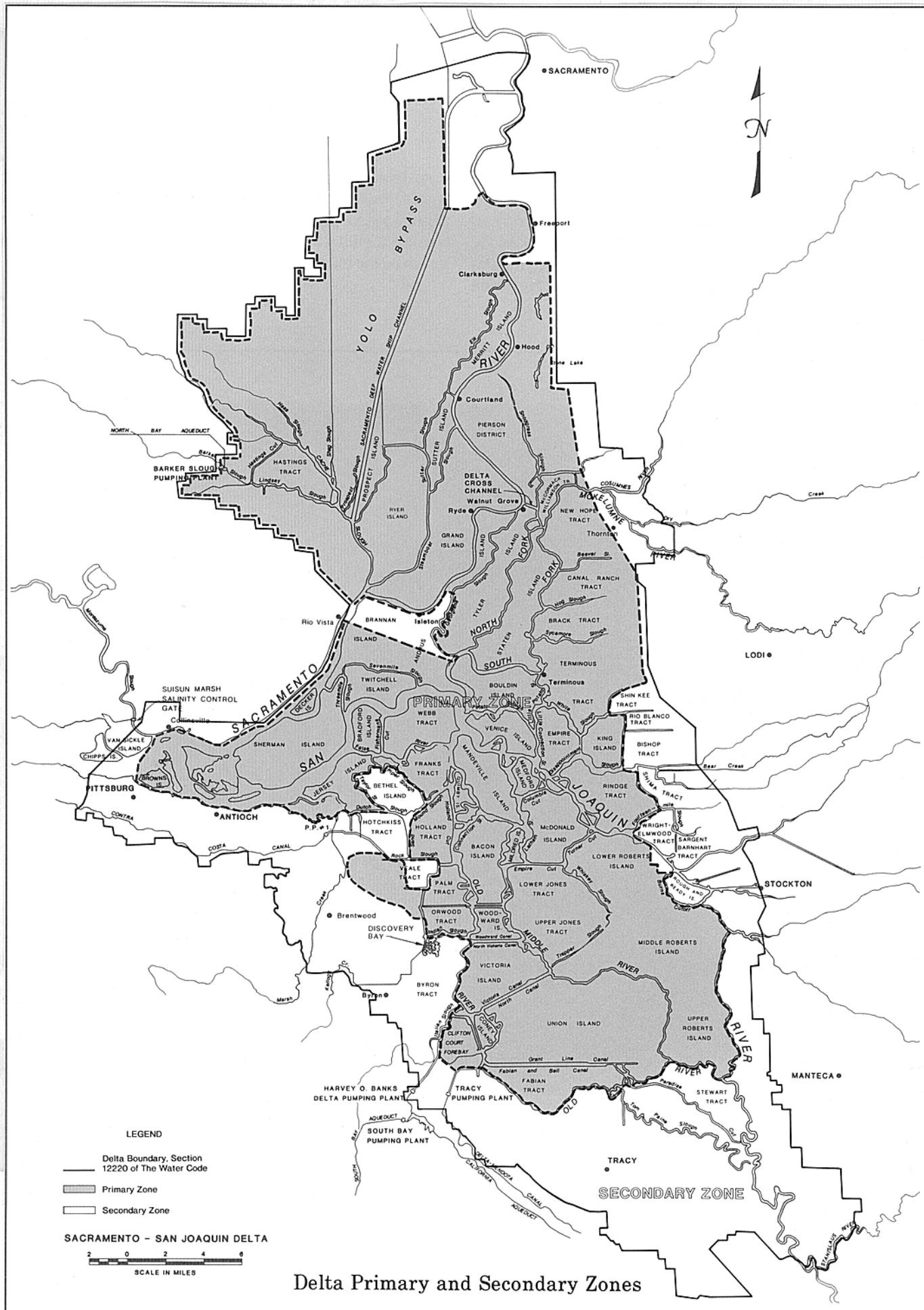
Land uses in the Delta are directly related to the physical environment of the Delta and in turn affect the habitat values. Utilities and other infrastructure land uses have been located in the Delta because the area is relatively flat, is largely unpopulated, contains valuable resources, and is located between other, more populated areas. The utilities and infrastructure developments are of two types: facilities that serve the existing residents and land uses in the area, and those facilities which simply pass through the area.

The constructed elements include: power lines, gas and water pipelines, natural gas production facilities, sewage treatment facilities, roads, bridges, and others (See Figure 2). These elements impact the type and quality of wildlife habitats, have potential for adversely impacting humans, and have aesthetic impacts on recreational and open space uses in the Delta. Over time, project sponsors have learned the challenges of building on the fragile peat soils in the Delta including soil subsidence, possible seismic impacts, and possible soil liquefaction.

The benefits of locating regional facilities in the Delta, include its flat terrain, large parcels, low population densities, key location between geographic regions, and proximity to important natural resources. Local utilities are necessary to support the agricultural, residential, and recreational land uses in the Delta.

Some of these facilities are regulated by local government, for example potable water wells, sewage treatment facilities, and gas wells. Other regional facilities, including power lines and gas pipelines, are regulated by State and federal regulatory agencies, including in some cases the State Public Utilities Commission, and thus are exempt from local permits.

This background report will describe the utility and other infrastructure uses in the Delta at the present time, describe pending plans for other such uses, and discuss the impacts associated with these uses.



Rec. No.	Dist.	District Name	Acres	Railroads	Public Roads	Utilities
2028		Bacon	5,625		x	x
756		Bouldin	6,006		x	x
2033		Brack	4,873		x	
2059		Bradford	2,051			x
		Brannan-Andrus	13,000		x	x
		Browns Island	595			
2086		Canal Ranch	2,996		x	
2117		Coney	935			
2111		Dead Horse	211			
2029		Empire	3,430		x	x
773		Fabian	6,530		x	
2113		Fay	100			
1002		Glanville (Portion in Delta)	7,000		x	
3		Grand Island	17,010		x	

FIGURE 2

Improvements on Delta Islands

Source: DWR, Delta Atlas, 1993 (with adjustments)

Rec. No.	Dist.	District Name	Acres	Railroads	Public Roads	Utilities
2060		Hastings Tract	7,150			x
2025		Holland	4,060		x	
2116		Holt Station	37			
830		Jersey	3,471		x	x
2038		Jones, Lower	5,894	x	x	x
2039		Jones, Upper	6,259		x	x
2044		King	3,260		x	x
2118		Little Mandeville	376			
2027		Mandeville	5,300			
2110		McCormack-Williamson	1,654			x
2030		McDonald	6,145			x
2041		Medford	1,219			
150		Merritt Island	4,740		x	

FIGURE 2

Improvements on Delta Islands (continued)

Source: DWR, Delta Atlas, 1993 (with adjustments).

Rec. No.	Dist.	District Name	Acres	Railroads	Public Roads	Utilities
2021		Mildred (flooded)	998			
348		New Hope	9,300		x	x
2024		Orwood	4,138	x	x	x
2036		Palm	2,436			x
551		Pierson District	8,980			
1667		Prospect	1,228			
2090		Quimby	769			x
2037		Rindge	6,834			
684		Roberts, Lower	10,600			x
524		Roberts, Middle	13,687		x	x
544		Roberts, Upper	8,260		x	x
501		Ryer Island	11,880		x	
341		Sherman	9,937		x	

FIGURE 2

Improvements on Delta Islands (continued)

Source: DWR, Delta Atlas, 1993 (with adjustments).

Rec. Dist. No.	District Name	Acres	Railroads	Public Roads	Utilities
2089	Stark	734		x	
38	Staten	9,173		x	x
349	Sutter Island	2,620		x	
548	Terminous	10,470		x	x
1601	Twitchell	3,516		x	x
563	Tyler	8,583		x	x
1	Union, East	9,622		x	x
2	Union, West	12,580		x	x
556	Upper Andrus	2,450		x	
2023	Venice	3,220			
2040	Victoria	7,250		x	x
554	Walnut Grove	400		x	x
2026	Webb	5,490			

FIGURE 2

Improvements on Delta Islands (continued)

Source: DWR, Delta Atlas, 1993 (with adjustments).

Rec. No.	Dist.	District Name	Acres	Railroads	Public Roads	Utilities
2072		Woodward	1,822			x
2119		Wright- Elmwood			x	x

FIGURE 2

Improvements on Delta Islands (continued)

Source: DWR, Delta Atlas, 1993 (with adjustments)

## CHAPTER I: UTILITIES

### 1. Transmission Towers

Transmission towers are vertical, aboveground elements installed to transmit radio or television waves. The Delta is an attractive area to install such facilities because there are open areas (agricultural fields) to place the antennae and the area is open and flat allowing the waves to transmit unaffected for long distances.

Four television transmission towers are located east of Walnut Grove, Sacramento County. Three are owned by the large television stations in the areas--Channels 3, 10, and 13, and the fourth is owned jointly as an auxiliary tower (1). The towers are between 1,500 feet and 2,000 feet tall, are lighted to provide warning for aircraft, and are securely fastened to the ground by a series of large guy wires. Each tower has a utility building at the base.

There are two radio transmission towers near Locke. These tall towers also are lighted to provide aircraft warnings and are supported by wires attached to the surrounding ground. Air Force and Navy radio towers are located in western Yolo County.

No new radio or television towers are currently proposed. Radio and television towers need conditional use permits from the local government; federal facilities need no local approvals.

The television towers are located in agricultural fields, but do not preclude continued agricultural use of the sites. The federal facilities are in areas not used for agriculture. There have been no studies or reports of adverse impacts to wildlife from the towers (2), nor have there been reports of impacts from electro magnetic forces near the towers. The towers have a visual impact on the Delta; some say they are navigational aids to Delta sailors who may get disoriented in the sloughs.

### 2. Electrical Transmission Lines.

The Delta has both distribution lines and regional transmission lines. The small scale lines service existing residential, agricultural, and commercial uses in the Delta. The larger, regional transmission lines distribute electricity between regions of the western United States and within regions of the State (see Figure 3).

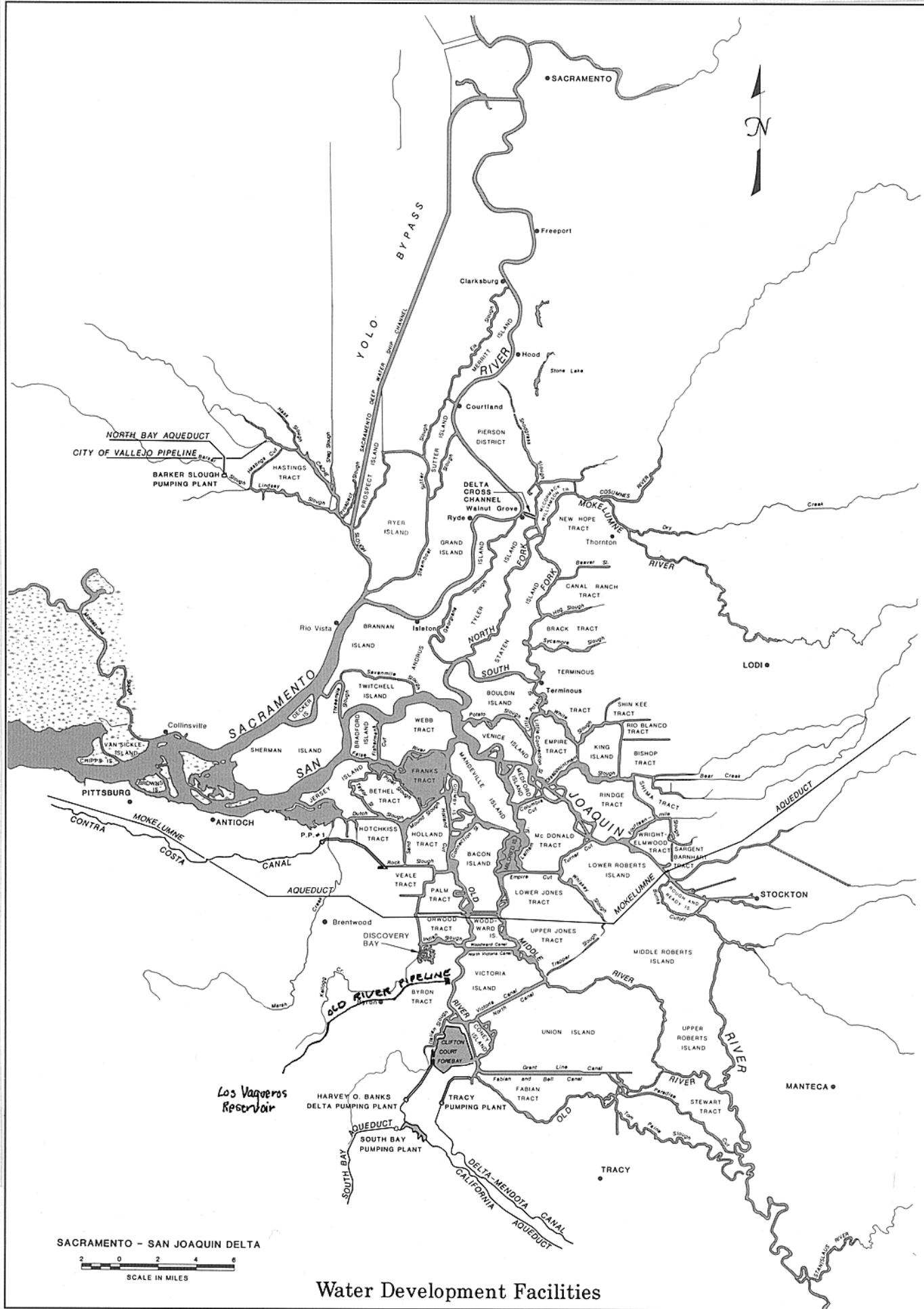
Local lines are connected to poles from 35 to 65 feet tall, at 60 kV, 21 kV, or 12 kV (3), located along existing roads and right-of-ways. Electrical service is needed for residential use and agricultural use, such as pumping. Pacific Gas and Electric (PG&E) and Sacramento Municipal Utility District (SMUD) both provide local electrical service in the Delta.

Regional lines are suspended on towers between 90 to 120 feet tall and carry lines at either 230 kV or 500 Kv. Two 500 kV lines belong to PG&E connecting a distribution station in Tracy to areas in the north. Western Area Power Administration (WAPA) has a 230 kV line that also connects to the Tracy substation. The new California-Oregon Transmission Project, a 500 kV, 350-mile-long line between central California and southern Oregon, is partially within a WAPA right-of-way. A new 27 mile segment crosses the Delta. The towers are between 116 feet and 211 feet tall.

New local electrical lines should be expected when new developments are approved through the land use permit process. A new regional transmission line was recently approved and constructed in the Delta. No local permits are required; approvals are required from the State Public Utilities Commission. Local governments provide comments on environmental documents and coordinate the preparation of mitigation plans.

Smaller, local electrical lines have minor impacts on birds (4). SMUD has changed to plastic-coated wires, developed new grounding techniques, and installed bird guards on transformers to avoid power outages due to bird electrocutions.

The larger, regional lines have two impacts on birds. First, reduction in habitat usage under the transmission lines and second, collision mortality. The mitigation plan for the new Oregon California transmission line states that wildlife biologists have identified avoidance of areas 100 meters from center of easements under existing lines for nesting and foraging in a recent three year study (5). To mitigate reduction in habitat usage under the new line, the project proponents are providing 1,200 acres of permanent habitat, owned by the proponent, and managed in accordance with the Department of Fish and Game goals. The mitigation site will provide some permanent wetlands and some farmed areas which will provide grains for migratory waterfowl to consume (6).



Water Development Facilities

FIGURE 3

Collision mortality is a documented adverse impact associated with transmission lines; losses seldom exceed 50% of number crossing the right-of-way and typically are much lower. Almost all collisions involve birds striking the relatively thin overhead groundwires located above the heavier conductors because a vast majority of waterfowl fly over transmission line corridors. Fog increases chances of collision, especially for raptors. Removal of groundwires when possible or marking wires with aircraft warning balls will minimize loss from collision by 50%. (7).

Another disturbing hazard noted locally is mortality to birds and other small animals that touch wires and steel structures at the same time resulting in electrocution. The animal carcass or sparks caused by an incident can result in fires in grassy areas under the towers. PG&E is studying mechanical means of preventing such events (8).

### 3. Telephone Lines.

Local telephone lines are located along existing roadways and utility corridors. The lines and poles can be an obstruction to avian wildlife. Regional lines, both coaxial and fiber optic lines, are located underground in utility corridors along highway and railroad alignments.

New lines would be required for new developments. Approval would be required from a County Public Works Department prior to installation. No new regional lines are proposed by AT&T (9).

### 4. Pipelines.

A number of pipelines cross the Delta transporting water, petroleum, and natural gas. In addition, local pipelines transport natural gas from extraction sites in the Delta to storage and processing facilities. Most of these pipelines are buried; some pipelines are aboveground. Most pipelines are located within existing corridors, in road or railroad rights-of-way, under utility lines, etc. New pipelines crossing waterways have been installed below the bottom of the waterway.

Pipelines transporting oil and gas are regulated by the California Public Utilities Commission, under safety standards set out in the Department of Transportation Pipeline Safety Regulations. The proposed SMUD natural gas pipeline, to service four proposed co-generation power plants, is under the jurisdiction of the California Energy Commission (CEC). Local government review is limited to comments on the environmental review document and participation in negotiations with the CEC and SMUD.

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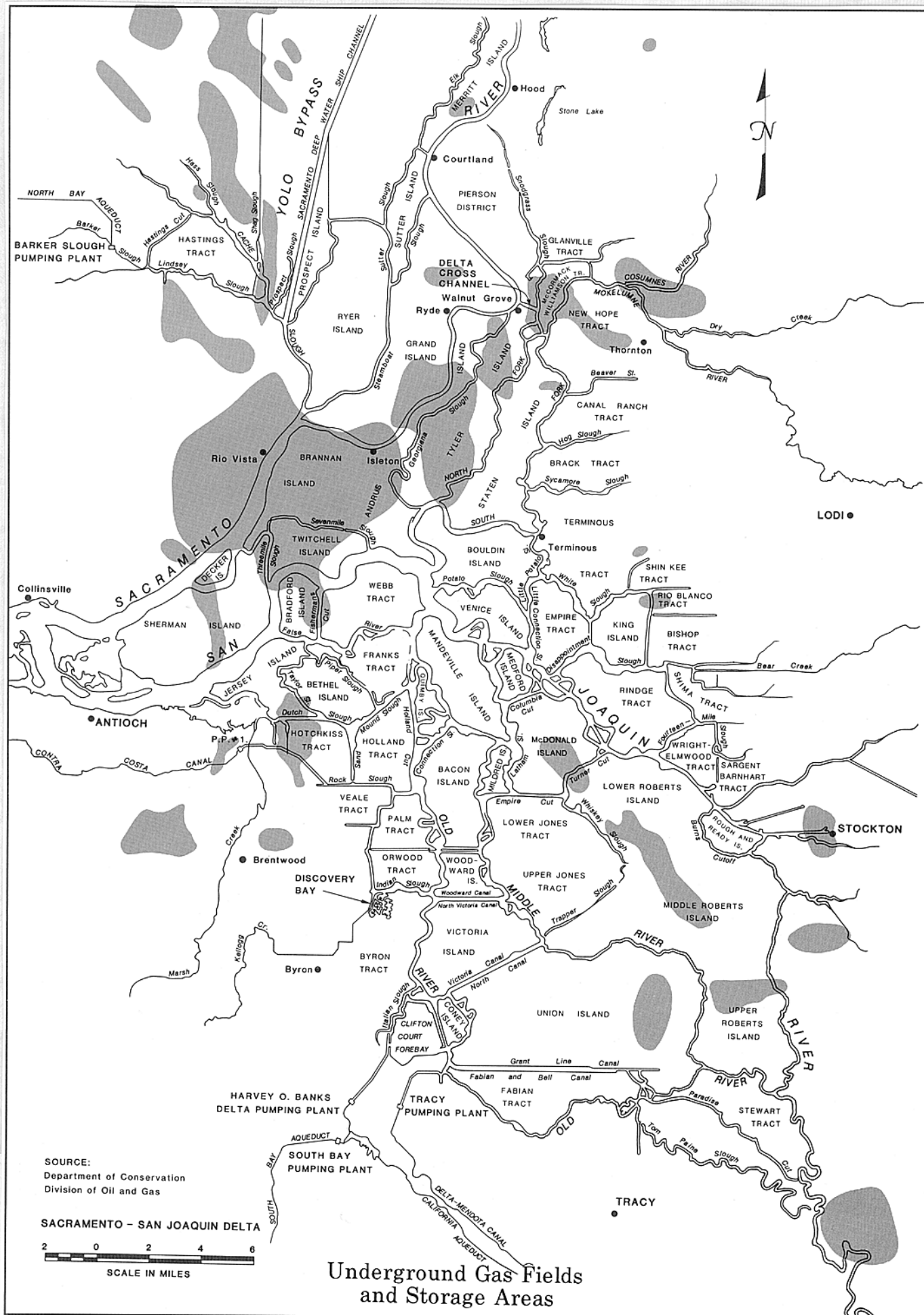
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a. Natural Gas Pipelines. The Delta contains some of the most productive natural gas fields in the State, however, production has decreased substantially in the past decade (10). The largest of the two dozen fields are under Brannan Island, Twitchell Island, and Bradford Island. Other large fields underlie Tyler Island, McCormack-Williamson Tract, the Yolo Bypass, Hotchkiss Tract, Jersey Island, McDonald Island, Roberts Island, and Union Island. The area under McDonald Island serves as a PG&E natural gas storage facility (See Figure 4).

Natural gas pipelines within the Delta connect gas wells to the storage and processing facilities. The pipeline under McDonald Island operates in this manner. Gas pipelines pass through the Delta, transferring gas between regional facilities. PG&E is constructing a major pipeline from Canada to Southern California within existing utility alignments, under a transmission line, and along I-5 (11). The Mojave Pipeline Company has recently proposed a 600-mile-long pipeline to bring gas from the present terminus in Bakersfield to the Sacramento area, Fairfield, and the East Bay (12).

Impacts associated with construction of underground pipelines include removal of existing vegetation and loss of associated wildlife habitat. Access to the pipeline alignment is required for inspection and maintenance. If placed close to the surface of the soil, the pipes could interfere with normal farming activities. Placement within existing utility corridors, or along existing road rights-of-way minimizes conflicts with wildlife habitat and agriculture. To cross waterways, pipes must either be buried below the waterway or suspended from bridges. Construction in a waterway will have temporary adverse impacts associated with dredging and suspension of sediments.

b. Petroleum Pipelines. Petroleum pipelines cross the Primary and Secondary zones of the Delta. For example, Chevron has a six inch-in-diameter, underground pipeline which carries crude oil from West Pittsburg under Suisun Bay, through the Suisun Marsh to the northwest portion of the Delta, following the Sacramento Northern Railroad right-of-way, then under the Sacramento Deep Water Channel, north through West Sacramento, and under the Sacramento River to the Sacramento Terminal near the intersection of I-80 and I-5 (13). Southern Pacific Pipe Line has several lines (8 to 12 inches-in-diameter) crossing the Delta located mostly within railroad rights-of-way, and Santa Fe has an eight inch-in-diameter petroleum product pipeline between Concord and Stockton (14). Brentwood construction workers recently broke this pipeline and subsequently released several hundred gallons of diesel fuel (15). This incident illustrates possible problems associated with petroleum pipelines.



c . Water Pipelines and Canals. Several large water pipelines and canals transport water from the Delta to nearby areas or across the Delta (see Figure 5, Water Development Facilities).

The 80-mile long Mokelumne Aqueducts, owned by East Bay Municipal Utility District (EBMUD), transport fresh water from Pardee Reservoir in the Sierra foothills to serve a 1.2 million population in the east San Francisco Bay Area. The aqueducts cross Roberts Island, Lower Jones Tract, Woodward Island, and Orwood Tract. Portions of the large aqueducts are above and below ground. The aqueducts are located within a 100-foot-wide corridor. EBMUD is proposing a major seismic upgrade of the aqueducts, but all work will be within the existing corridor and will not enlarge the aqueducts (16).

The North Bay Aqueduct is a 27 mile-long, underground pipeline that transports water from Barker Slough (in the Primary Zone) to the Fairfield-Suisun area, then on to Napa County. The six foot-indiameter pipeline is part of the State Water Project and transports approximately 50,000 acre feet of water per year (17).

The Contra Costa Canal is an open channel that transports water from Rock Slough to Antioch, through Contra Costa County, and terminating in Martinez. The 52 mile-long Canal parallels the Mokelumne Aqueducts. The Canal is part of the Central Valley Project, is owned by the U.S. Bureau of Reclamation, but maintained by Contra Costa Water District (18).

The City of Vallejo receives a portion of its water supply from Cache Slough in the Primary Zone, transported by pipeline to the City's reservoirs (19).

#### 5. Drinking Water Supplies for Delta Residents.\*

Potable water for Delta residents and visitors is supplied primarily by well water. The shallow water table and soft deep soils make groundwater an easily accessible resource; one that is constantly recharged by the Delta river system.

\*NOTE: The State Water Project and the Central Valley Project are discussed in the background report entitled "Background Report on Delta Water Issues."

County General Plans and codes direct communities and large residential and recreational projects to develop community water supplies. These systems must be maintained at appropriate water quality levels to protect human health. Some of the systems are community systems and some are provided by private companies. Many of the community systems have inadequate water pressure for firefighting and must provide supplemental facilities (pumps) linked directly to river water supplies.

Individual wells serve the agricultural and other rural residences. Once individual wells are permitted, constructed, and inspected, no further governmental review is required.

Many residents of the cities in the Secondary Zone obtain water from the Delta waterways under riparian water rights. For example, the City of Antioch has an intake line at the east end of town, near the boat launch ramp.

Water to serve industrial users in the Secondary Zone are also obtained from Delta waterways.

#### 6. Sewage Treatment Facilities.

Communities and large residential and recreational projects are served by sewage treatment facilities. As required by the federal Clean Water Act, National Pollution Discharge Elimination Permits (NPDES) are issued by the Central Valley Regional Water Quality Control Board. Generally, communities with more than 100 households are subject to community wastewater treatment requirements (20). Most of the Delta community treatment facilities process wastewater and evaporate the treated wastewater in large open ponds; the Regional Board encourages disposal of wastewater on land (21).

The communities of Walnut Grove and Courtland are two examples of treating wastewater through evaporation. Walnut Grove processes wastewater and releases the treated wastewater into Snodgrass Slough in the winter months. Between May 16 and October 31, the treated wastewater is percolated/evaporated in large ponds. The treatment facility consists of one primary treatment pond, two secondary ponds, a disinfection system, and three evaporation/percolation ponds for disposal of effluent during the nondischarge periods. The ponds cover about 15 acres (22). Courtland processes wastewater using a biological process with disposal from percolation/evaporation ponds; there is no discharge (23).



Smaller communities and individual homes use septic tanks and leach fields for wastewater disposal. The Regional Board has adopted guidelines for installation of septic tanks, but leaves authorization and inspection to Counties. Septic tanks are prohibited in Courtland Sanitation District (Sacramento County) (24). Some counties, for example Yolo County, have adopted regulations which require elevated leach fields for houses built within the flood plain to ensure adequate dispersion of wastewater. Elevated leach fields are constructed of fill placed above the existing ground level.

Most of the Cities surrounding the Delta have located their sewage treatment facilities and ponds in the open, unpopulated areas adjacent to the Primary Zone of the Delta. The Cities of Sacramento, Stockton, West Sacramento, Lodi, and others also operate facilities near the Primary Zone. Most of the facilities discharge treated wastewater into sloughs and rivers which flow into the Primary Zone. The proposed Mountain House project in San Joaquin County studied an alternative which included construction of 200 acres of wastewater ponds and irrigation of 1,600 acres of non-food crops such as alfalfa and sudan grass in the Primary Zone (25).

Urban treatment facilities are developing alternatives to releasing treated wastewater into Delta rivers and sloughs. An example is the creation of wetlands irrigated by effluent which has undergone secondary treatment near the Sacramento Regional County Sanitation District's treatment facility north of Laguna (26). This concept is also under consideration by the City of Tracy for its proposed treatment plant expansion. Other cities including Stockton and Lodi (27), and Bethel Island, are studying reuse of wastewater for irrigation of agricultural (pasture) lands. Ironhouse Sanitary District, which serves Bethel Island, is proposing a tripling of treatment capacity between now and the year 2015 (28). Treated wastewater would be released onto Jersey Island in the Primary Zone.

The Central Valley Regional Water Quality Control Board is studying possible usage of sludge from wastewater treatment plants and septage from septic tanks as fertilizer and/or soil amendment on agricultural lands; material that is currently placed in landfills. The material may have value as a soil amendment because of its high levels of nitrogen, phosphorus, micronutrients, organic material, and liming agents. If use is authorized, conditions to protect public health would include: no human access for 30 days, no dairy grazing or harvesting of aboveground crops for one year, and no harvesting of belowground crops for three years (29).

7. Solid Waste Disposal.

No active solid waste disposal sites are located in the Primary Zone of the Delta. The Isleton Dump, at the western tip of Grand Island, is now closed. While County General Plans generally allow solid waste disposal facilities in the agricultural zone with appropriate permits, the high water table, unstable peat soils, and continuous subsidence eliminate most of the Delta from feasibility for solid waste disposal sites. Communities in the Delta are served by refuse disposal companies which transport trash to landfill sites outside the Delta. There are currently no recycling programs for Delta residents, although recycling facilities are located on the periphery of the Delta.

Composting of yard clippings and agricultural bi-products are a form of recycling which reduces landfill disposal. Currently agricultural bi-products are largely disposed on site. Some organic materials are burned on site and the residue tilled into the soil.

[Note: Dredged spoil disposal is discussed under "commercial shipping".]

## CHAPTER II: GAS FIELDS AND WELLS

The Delta is located atop several productive natural gas fields which spread under all five Delta counties (see Figure 4). The largest of the approximately two dozen fields are under Brannan, Twitchell, Bradford, Tyler, Jersey, McDonald, Roberts, and Union Islands, McCormack-Williamson Tract, Hotchkiss Tract, and the Yolo Bypass. While the fields are active, production has decreased from 1.7 billion cubic feet to 20 million cubic feet in the past decade (30). Most Delta wells are between 9,000 and 12,500 feet deep with producing intervals in formations from the Mesozoic Era of the Cretaceous Period (31). New technology and deeper drilling may add to gas production.

Rights to extract the gas are purchased by extraction companies and utilities. Well installation is allowed in agricultural zones, but usually requires a use permit from the County. In addition, gas well operations are regulated by the State Department of Conservation, Division of Oil and Gas. Surface construction may include access road, fenced pad, the well and associated pipes, and compressors and pumps. When a well is abandoned, the well must be capped and sealed six feet belowground. All infrastructure must be removed to allow return of the land to agriculture or other uses. Abandoned wells must be inspected by the Department of Conservation to ensure compliance (32).

PG&E owns and operates several gas fields and distribution pipelines in the Delta. McDonald Island in San Joaquin County is a very large underground gas storage site. In 1991, McDonald Island provided almost one-third of the State's underground gas storage, with over 125 million cubic feet stored at the end of 1991 (33). The gas is stored over 5,000 feet below ground level (34).

In 1974, and again in 1993, the facilities at McDonald Island suffered accidental explosion and fire. The October 1, 1993 accident was caused by an explosion in a moisture extractor (a piece of equipment that cleans natural gas before it is put into storage) which resulted in 40% production loss (35). Debris from the accident landed within a one mile radius, causing property damage to trailers and boats in the area of Turner Cut and Tiki Lagun (36). The explosion was heard up to twenty miles away. The Coast Guard found no major pollution damage from the blast (37) and the facility's automated fire-extinguishing system put out fires.

## CHAPTER III: TRANSPORTATION: LAND

### 1. Railroads.

Railroads were once the mainstay of agricultural produce transportation in the Delta and throughout the State (See Figure 6). The primary transportation of crops has shifted to trucking in recent decades, but railroads still carry products and passengers.

The railroads were built atop levees or elevated alignments built by dredging borrow pits nearby. Many of the old railroad alignments have been abandoned and sold to private land-owners. Delta Meadows, a borrow area and the adjacent upland rail alignment, was purchased by the State Parks Department for future development as a State facility. The borrow area is a very popular destination for recreational boaters.

The Yolo Shortline Railroad Company is an example of a new trend in the region to reactivate the existing, short lines for intra-regional transport. The line runs from Clarksburg, in the Primary Zone, to the Port of Sacramento in West Sacramento, and to Woodland (38).

Santa Fe Railroad has an active line crossing the Primary Zone between the East Bay and Stockton. The line runs from Pittsburg to Stockton. The tracks are on a levee between Palm and Orwood Tracts, and supported above the channel between Bacon and Woodward Islands. The tracks continue across Jones Tract and Roberts Island.

Other rail lines around the Delta include: Union Pacific and Southern Pacific between Stockton and Sacramento, and the Southern Pacific line between the Bay Area and Sacramento, parallel to I-80.

AMTRAK provides three round-trips a day between San Jose and Sacramento on the Southern Pacific Tracks, carrying 120, 000 persons in April 1992. In addition, AMTRAK operates several passenger trains on the Santa Fe tracks between Oakland and Bakersfield via Stockton (39).

No new lines are proposed. Recent actions regarding regional transportation, promote the use of commuter rail cars on existing tracks to relieve freeway congestion, for example between East Bay and Stockton on the Santa Fe Railroad right-of-way (40).

## 2. Freeways.

The Delta is bounded by several freeways, which help to define the Primary Zone (see Figure 7) . Multi-laned roads provide substantial barriers to wildlife and agriculture, but often attract commercial development.

To the north, I-80 links the Bay Area and Sacramento, bridging the Yolo Bypass. There are no plans to widen this freeway.

To the east, I-5 is a major north-south corridor which links Stockton and Sacramento. The freeway was built in the late 1970's to supplement State Highways 99 and 160. The freeway is four lanes wide and a major truck route. The freeway may need to be widened to accommodate future traffic demands.

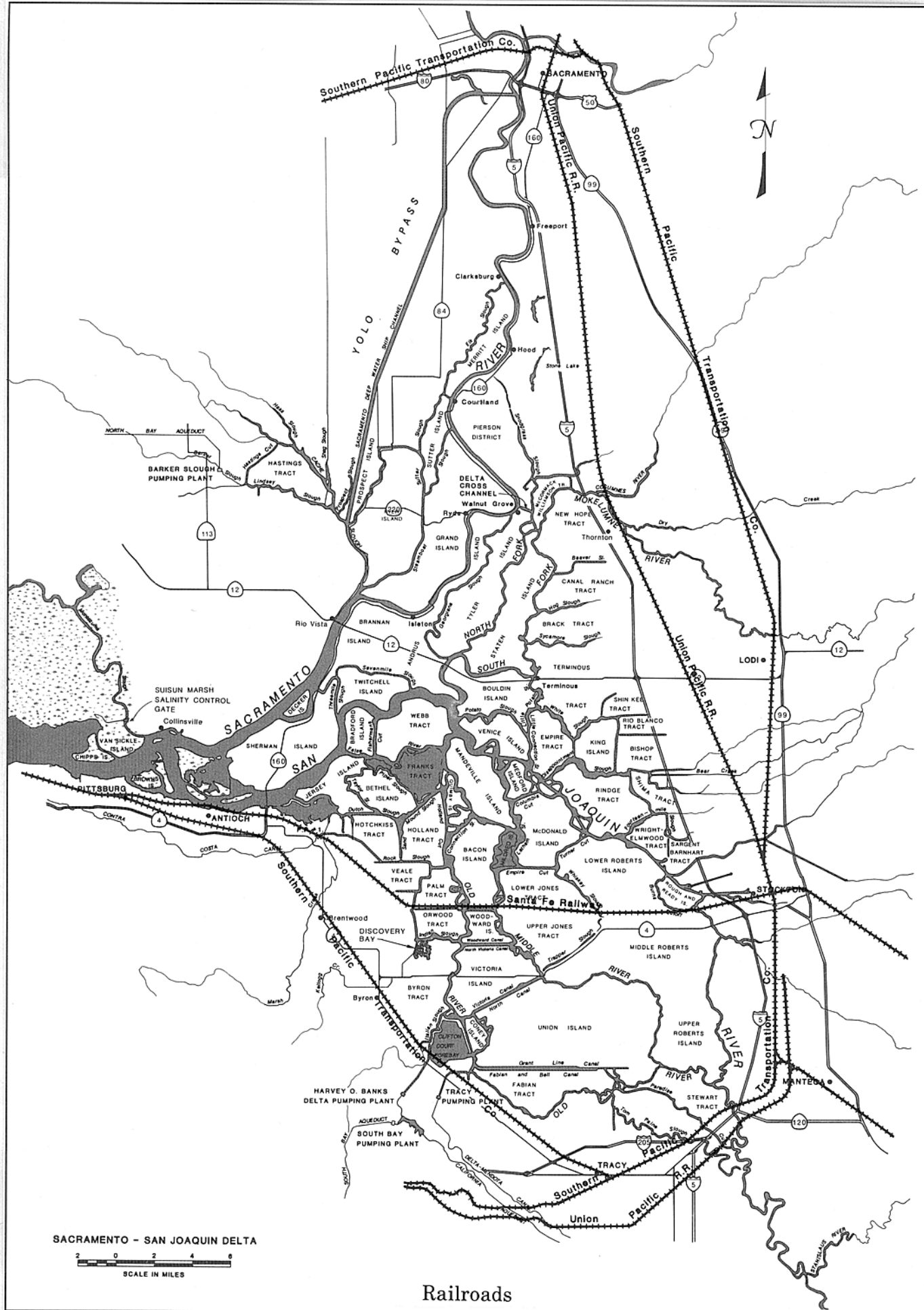
CalTrans has considered constructing a bypass to branch off from I-5 south of Sacramento, pass near the Sacramento River Deep Water Ship Channel or the Yolo Bypass, and rejoin I-80 near Woodland, providing access to the Port of Sacramento (41). The proposal indicates that the bypass would be located in the Primary Zone.

As congestion increases, CalTrans will construct new Park and Ride lots along I-5 between Stockton and Sacramento (42).

## 3. State Highways.

In the Delta, little differentiates State highways from other roadways (see Figure 7) . All the State Highways are two-lanes: Highway 160 connects Sacramento to the Antioch Bridge; Highway 12 links Lodi and Rio Vista, and Highway 4 links Stockton to Brentwood and Oakley, and beyond. All of these highways are heavily used, and can be extremely dangerous, particularly in the winter fog and when bridges open. The unstable and subsiding soil of the central Delta creates undulations in the road surface. Speeding, drinking and driving, and unsafe passing also contribute to several deaths each year.

Highway 12 is a heavily used route linking I-5 (Lodi) and I-80 (Fairfield) ; addition of passing lanes is proposed in 2007 and 2008, using San Joaquin County Measure K transportation taxes. Highway 12 has a high level of truck use (20%) and is rated level D, a high level of congestion (43) . Highway 160, a designated scenic roadway, is built atop narrow levees. Highway 4 is a major route from the East Bay to the marinas located in the Bethel Island area; it also continues east through the Delta to Stockton. Highway 220 connects Ryde to Highway 84, Jefferson Boulevard, the road into West Sacramento and the Port of Sacramento.





All of these roads were built to handle local and agricultural traffic at moderate speeds. The roads are now used for regional truck transport, recreational access, and for regional commuting. These new users all operate at high speeds. Recreational and truck traffic create impacts on roadways (congestion; pavement breakdown) which are paid for by County residents, rather than the users (44) .

Safety barriers are located along only very limited portions of the highways; there are very few streetlights. There is virtually no area for parking and no room for bike lanes.

An ongoing \$4.2 million CalTrans project is widening Highway 160 between the Rio Vista Bridge (intersection with Highway 12) and the Antioch Bridge. The resulting road will have two 12-foot-wide lanes and two 8-foot-wide paved shoulders. Under State Code, no parking is allowed on the shoulders and there will be no safety barricades.

The Delta lies within three separate Caltrans Districts: District 3 north of Isleton, District 4 west of Old River, and District 10 south of Isleton. While the districts communicate about proposed programs and projects to other districts, there are no regular meetings between districts to discuss Delta projects or issues.

#### 4. Toll Road.

CalTrans is reviewing a proposal to build a privately constructed, 85-mile-long toll road connecting Solano County, across the San Joaquin and Sacramento Rivers at Sherman Island, and south of Highway 4 to Tracy and I-580 and to Sunol and I-680. The proposal appears on the shelf at this time due to environmental considerations and cost factors (45).

#### 5. County Roads.

The Delta Counties maintain numerous narrow levee roads throughout the Primary Zone (see Figure 8) as well as on easements across island floors. The roads are built on easements on the levees. The cost of road maintenance is high due to settlement and cracking, the heavy trucks and farm equipment that travel the roads, and the need for continuous vegetation trimming.

#### 6. Bridges.

The approximately 70 Delta bridges (46) are vital links in the Delta transportation network, joining roads on the levees to other roads. Many bridges were built in the 1950's and 1960's to replace the ferries which previously linked the islands. Some of these older bridges are quite narrow and cannot hold two trucks at one time.

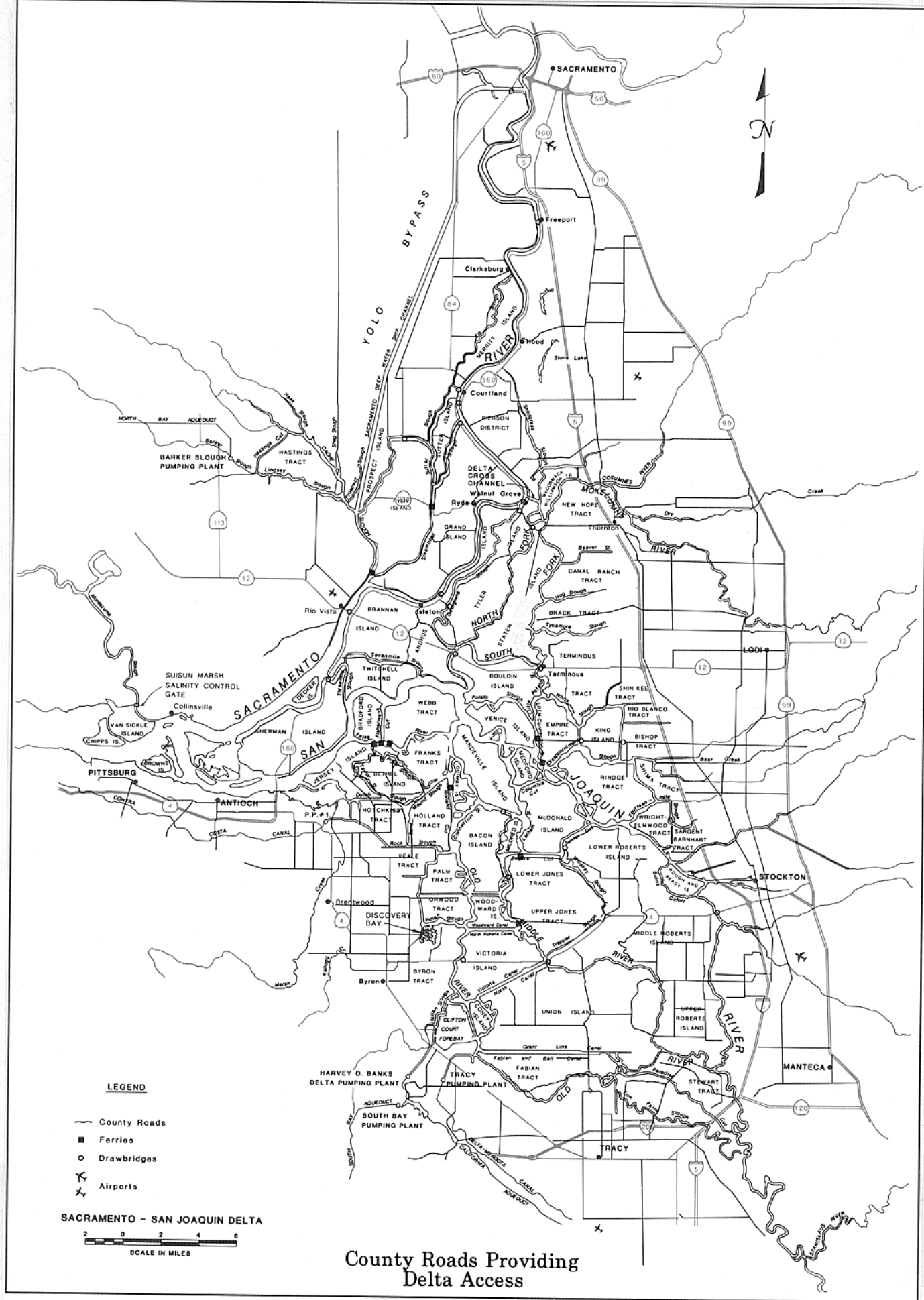
Although the old drawbridges are now landmarks and have great charm, the slowness of the lifting mechanisms is of concern to public safety officials with regard to lack of access in emergencies and possible delays to goods and materials transported by land. Due to the large number of recreational vessels in the waterways, most of the bridges can be opened, although some open often and some almost never. Access, even to remote channels and sloughs is necessary to allow for levee maintenance by barge. Some bridges are built high enough to allow most vessels to pass safely below.

The Antioch Bridge is the only toll bridge in the Delta; it is a two-lane fixed bridge high enough to allow vessel traffic.

CalTrans is studying two possible bridge replacement projects. A new bridge may be constructed on Highway 12 at Rio Vista to replace the drawbridge. options include building a parallel bridge or relocating the bridge north or south of downtown. Issues are compounded by possible future widening of Highway 12 from two to four lanes (47) . CalTrans is also studying increasing the capacity of the bridge on Highway 4 at Middle River in San Joaquin County.

Other bridges on county roads are being considered for upgrade and replacement as funding becomes available. Examples are: replace the one-lane bridge at Holland Tract with two-lanes; replace the bridge to Bethel Island; and replace and raise the bridge at Franks Tract.

Bridges must conform to U.S. Coast Guard regulations regarding bridge operation to ensure navigability of the waterways. Part of Delta bridges' expense is the cost of bridge tenders to open and close the bridges. To cut costs, some bridges operate seasonally, and some require several days notice. The Coast Guard maintains information regarding bridges which may affect boaters. The tender at the Rio Vista Bridge serves as an informal regional bridge supervisor for bridges of the Sacramento River (48).



## CHAPTER V: TRANSPORTATION: WATER AND AIR

### 1. Ferries.

There are five active ferries providing access to a few Delta islands (49) (see Figure 9):

- (a) The free-running diesel ferry, The Real McCoy, crosses Cache Slough linking Rio Vista and Ryer Island; public ferry.
- (b) The Victory II, is a free-running ferry which links Jersey Island to Bradford Island and Webb Tract; private ferry, not available to the public.
- (c) The J-Mack is a cable ferry that crosses Steamboat Slough, connecting Ryer Island and Grand Island; public ferry.
- (d) Cable ferry connects Empire Tract and Venice Island; Venice Island is a private island; public ferry.
- (e) The Woodward Island Ferry is a cable ferry that runs from Upper Jones Tract to Woodward Island; private ferry.

Some islands have neither bridge nor ferry (Medford, Quimby)

### 2. Commercial Shipping.

Commercial shipping began in the Delta during the Gold Rush of 1849, transporting miners and their equipment from San Francisco to Sacramento. Shipping in the Sacramento River was significantly adversely affected by sedimentation from hydraulic mining in the late 1800's. One of the first of several federal acts to ensure safe navigation in rivers was the Rivers and Harbors Act of 1899 (33 USC sec. et seq). Early flood control projects dredged the channels, increasing their capacity to transport flood waters. Dredging by the California Debris Commission in about 1915-1916 cut through the tip of the Montezuma Hills and created Decker Island in Solano County.

Modern commercial shipping was aided by the construction of two major shipping channels by the U.S. Army Corps of Engineers (see Figure 10) . The two shipping channels share common access via the John F. Baldwin Ship Channel, from Avon to Pittsburg.

Construction of the Stockton Deep Water Ship Channel was authorized in 1927 for a depth of 24 feet. Deepening of the Channel to a depth of 30 feet was authorized in 1935, and in 1965 authorization called for deepening the channel to 35 feet (measured from Mean Lower Low Water). The channel "shortened" the shipping route by cutting through channel islands in the San Joaquin River. Many of the islands were purchased and are still owned by the Port.

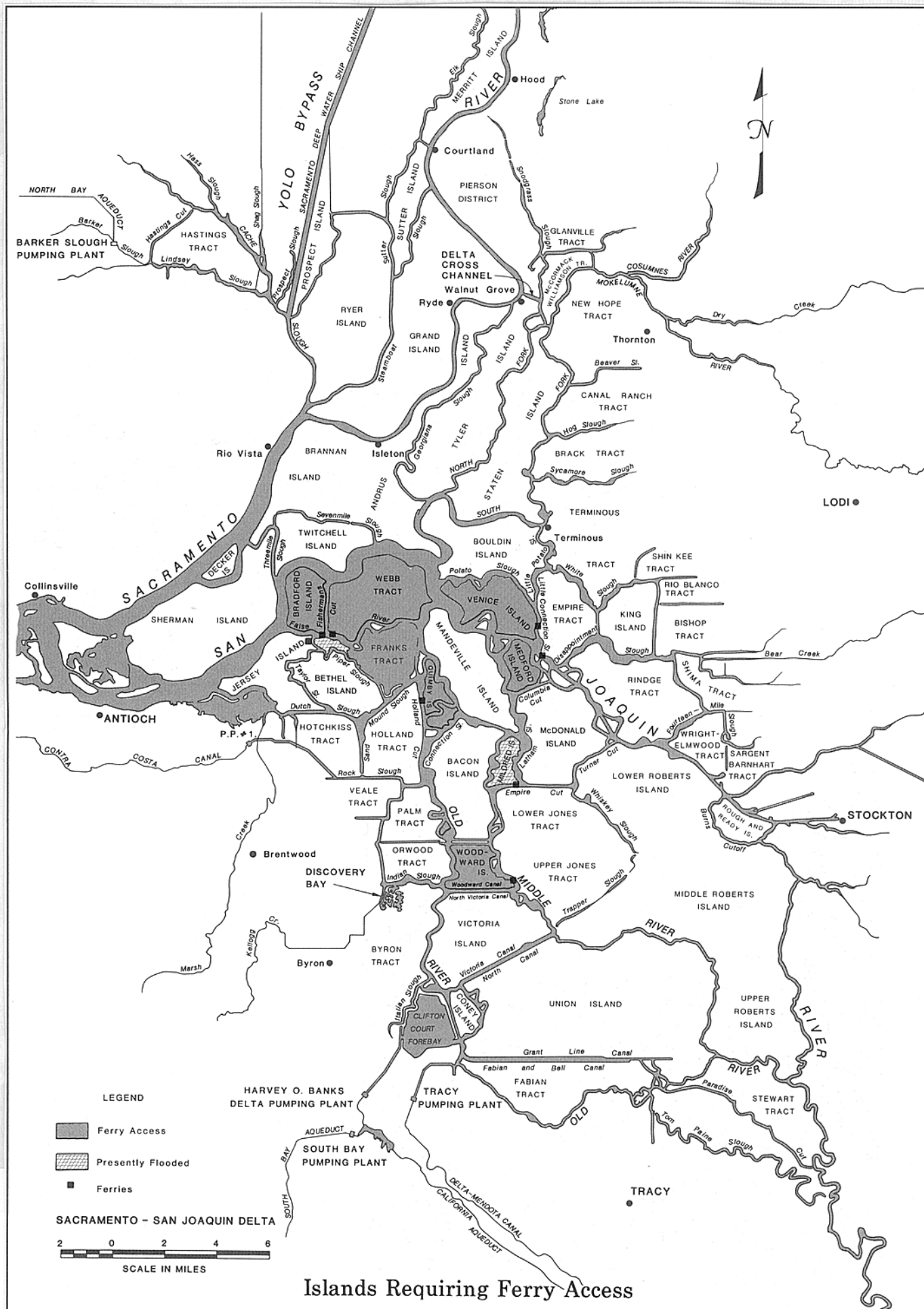
The Sacramento River Channel was authorized in 1946, construction began in 1949, and was opened for deep-water shipping in 1963 (50). Prior to 1963, there was only shallow draft access to Port of Sacramento. The Channel significantly shortened the shipping route by creating a new channel 30 feet deep and 200 feet wide east of the Yolo Bypass.

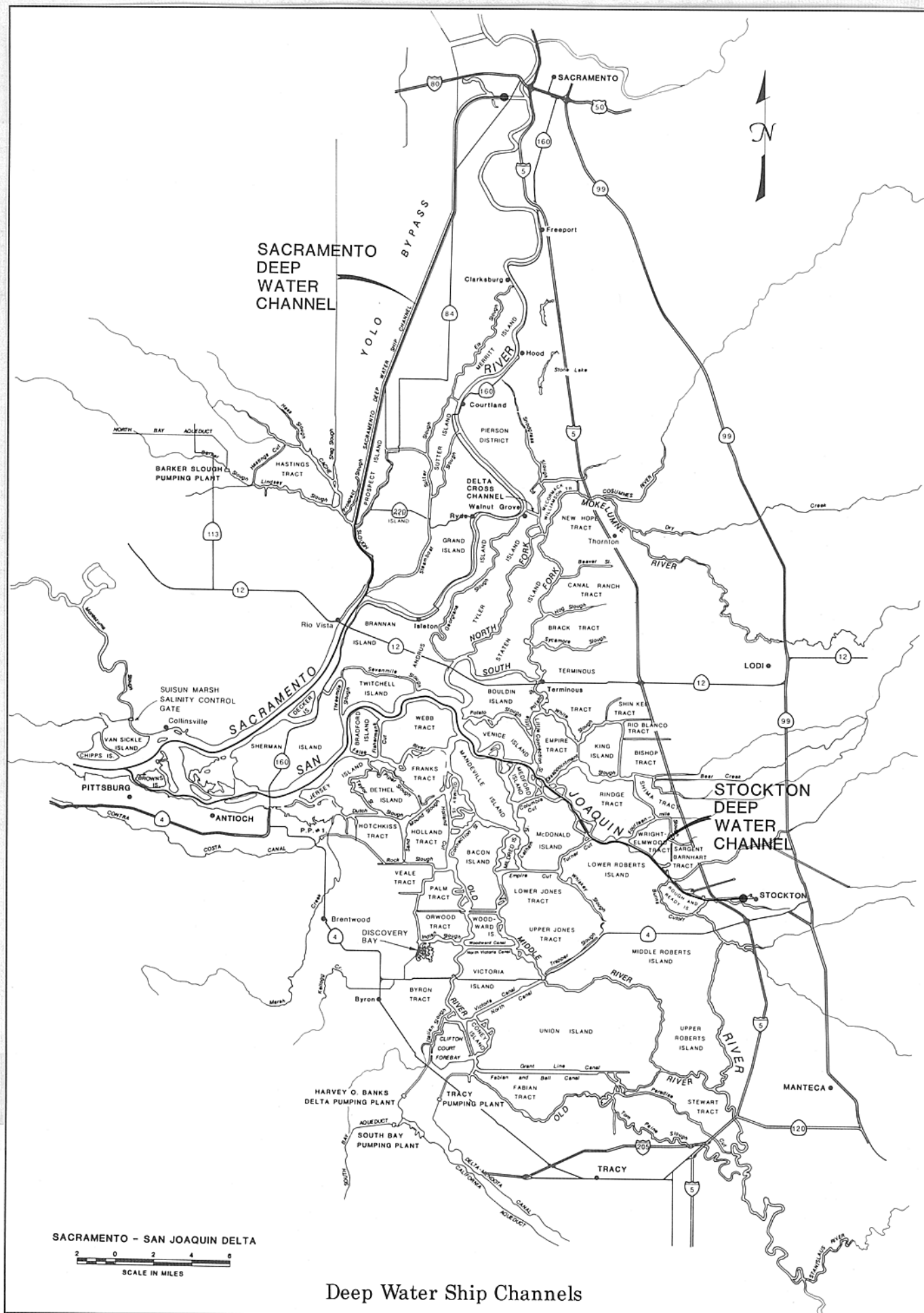
After completing a deepening project in 1987 (authorized in 1965), the Stockton Shipping Channel has an average depth of 35 feet (Mean Lower Low Water) with a four foot tidal range and can handle up to 50,000 ton class vessels fully loaded and up to 80,000 ton class vessels partially loaded. The Port can accommodate ten vessels up to 850 feet long (51). Some of the dredged materials from the most recent deepening project was placed on Donlon and Venice Cut Islands, resulting in creation of 81 acres of wetland habitat.

The Port facilities, located out of the Primary Zone, handle several million tons of product per year and are well-linked to major railways and freeways. The 600-acre Port of Stockton is one mile from I-5 and has access to three transcontinental railroads (52). The Port of Stockton supports agriculture with its cold storage of fruit and 6.5 million bushels of grain storage (53).

The Port of Stockton has diversified into about 15 cargoes, with none dominating in percentage of traffic. About half the Port is an industrial park where cargoes can be transferred among rail, truck, ship, and pipeline modes. Stockton has averaged \$12 million to \$16 million in annual revenues, compared to \$8 million to \$10 million for the Port of Sacramento. Stockton's indebtedness is about \$9.8 millions about half of that of Port of Sacramento (54).

The Port of Sacramento provides both domestic and international shipping services and handles less than 20% of California's port cargo. Two-thirds of the cargoes are exports to Pacific Rim destinations and are primarily agricultural and lumber products. There are currently no container shipping operations. The Port controls about 2,000 acres of possible expansion. There are also studies regarding feasibility of increased barge transportation between Sacramento and Bay Area ports (55).





Port of Sacramento records for 1993 show a profit of \$180,000 on revenues of \$10.75 million. Cargo volume was 1.12 million tons, a slight decrease from 1.2 million tons in 1992 (56).

In 1985, the Corps was authorized to deepen the Sacramento Deep Water Channel from 30 feet to 35 feet. Two of six contracts have been completed. Dredged materials were placed on upland areas, some of which previously had been used for spoils disposal (57) and some constructed specifically for this project. The Port is seeking about \$30 million to complete the dredging project (58). There is a dispute regarding a PG&E utility crossing under the channel which is delaying completion of the project. Mitigation for the deepening project includes creating wetlands on lower Prospect Island (59).

Much of the material dredged from the Sacramento Deep Water Channel and the Stockton Channel has commercial viability as building/construction material. Average annual maintenance dredging of the natural river portion is approximately 350, 000 cubic yards (60), although there is no annual dredging.

### 3. Air Transportation.

Borges-Clark in Yolo County is designated a "General Aviation" facility (61). Contra Costa County recently approved a new general aviation airport, the "Contra Costa Byron Airport" in the Secondary Zone, west of the Clifton Court Forebay. The Rio Vista Airport, recently completed, is located in the Secondary Zone northeast of Highway 12. Airports located outside the Delta include: Travis AFB, Sacramento Executive Airport; Franklin Airport; Stockton Metropolitan Airport; and Tracy Airport.

Within the Delta, there are numerous small landing strips for property owner use and small agricultural air strips used by commercial crop dusting services. A new crop dusting business started operation in Steamboat Landing in February of 1993 (62).

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#### Utilities and Infrastructure Findings:\*

- F-1. The flat, largely unpopulated Delta is a valuable site for regional utility corridors, such as transmission lines and pipelines.
- F-2. High voltage transmission lines have disrupted wildlife use patterns and resulted in the loss of birds due to collision with those lines.
- F-3. Isolated residential structures are served by independent potable water and sewage disposal systems.
- F-4. Delta communities are served by small community water systems and small community sewage disposal systems.
- F-5. Large communities on the edge of the Delta have located sewage treatment ponds at the edge of the Delta and release treated wastewater into Delta sloughs and rivers, and onto nearby agricultural lands.
- F-6. Most solid waste generated in the Delta is disposed of at facilities outside the area. Recycling is not readily available for Delta residents; in the Delta, agricultural waste is disposed of on site.
- F-7. Productive natural gas fields are located in the Delta. A large underground gas storage facility is located at McDonald Island.
- F-8. Surface transportation in the Delta serves the agricultural operations, transporting products out of the Delta to markets, and allows import of supplies and equipment. Other users of the Delta transportation network include regional trucking, regional commuters, recreational visitors, and local traffic within the Delta. Many existing Delta roads are historic, narrow, and nonconforming to present design standards. Drivers need to be aware of hazards and unique challenges that these roads pose.
- F-9. While some railroad rights-of-way within the Delta have been sold, many traveling through the Delta remain intact. Regional rail traffic, between the Bay Area and the Central Valley passes through the Delta. Spur lines create shorter

\*Findings Adopted by Delta Protection Commission on February 23, 1995.

links between processing facilities and the Ports. Rail traffic, both freight and passenger, is increasing as intermodal transportation planning develops. Several new or refurbished stations are planned in the Delta region.

- F-10. Bridges and ferries are key links for surface transportation in the Delta. Bridges impact vessel traffic on the waterways; some bridges rarely open requiring boats to travel alternate waterways. Some bridges open regularly, impacting surface traffic and creating possible delays in emergency response. The few remaining ferries are expensive to maintain and operate, and may be affected by cuts in State and local government budgets.
- F-11. Commercial shipping is an historic use of the Delta waterways. The two commercial shipping channels: Sacramento Deep-Water Channel and Stockton Deep Water Ship Channel, provide important transportation for movement of agricultural products from the Delta and other areas to faraway markets.
- F-12. Air transportation in the Delta is limited to small airstrips serving private property owners, small agriculture related businesses, and other limited use.

Utilities and Infrastructure Policies:\*

- P-1. Impacts associated with construction of transmission lines and utilities can be mitigated by locating new construction in existing utility or transportation corridors, or along property lines, and by minimizing construction impacts. Before new transmission lines are constructed, the utility should determine **if an** existing line has available capacity. To minimize impacts on agricultural practices, utility lines shall follow edges of fields. Pipelines in utility corridors or existing rights-of-way shall be buried to avoid adverse impacts to terrestrial wildlife. Pipelines crossing agricultural areas shall be buried deep enough to avoid conflicts with normal agricultural or construction activities. Utilities shall be designed and constructed to minimize any detrimental effect on levee integrity or maintenance.
- P-2. New houses built in the Delta agricultural areas shall continue to be served by independent potable water and wastewater treatment facilities. Uses which attract a substantial number of people to one area, including any expansions to the Delta communities, recreational facilities, or businesses, shall provide adequate infrastructure improvements or pay to expand exiting facilities, and not overburden the existing limited community resources. New or expanded construction of wastewater disposal systems shall ensure highest feasible standards are met, as determined by the local governing body. Independent treatment facilities shall be monitored to ensure no cumulative adverse impact to groundwater supplies.
- P-3. New sewage treatment facilities (including storage ponds) and new areas for disposal or use of sewage effluent and sewage sludge shall not be located within the Delta Primary Zone. The Rio Vista project, as described in the adopted Final Environmental Impact Report for such project, and the Ironhouse Sanitary District use of Jersey Island for disposal of treated wastewater and biosolids are exempt **from** this policy.  
(Adopted February 27, 1997)
- P-4. High groundwater tables and subsiding soil make the Delta an inappropriate location for solid waste disposal. Generation of waste shall be minimized through recycling programs for metals, glass, paper, cardboard, and organic materials. Recycling depots for these material shall be located in central locations to serve Delta residents, visitors, and businesses.
- P-5. Surface transportation in the Delta can be dangerous and congested. Roads within the Delta shall be maintained to serve the existing agricultural uses and supporting commercial uses, recreational users, and Delta residents. Where possible, commuter traffic and through **traffic** should be directed to surrounding highways and freeways, or minimized through programs which promote carpools, buses, or trains.

\*Policies Adopted by Delta Protection Commission on February 23, 1995

- P-6. Air transportation in the Delta shall be allowed to continue to serve Delta residents and agriculture-related businesses. Due to subsidence, transmission lines, high winds, fog, and high **raptor** and waterfowl use, the Primary Zone is not an appropriate location for new or expanded general aviation airports.
- P-7. Operation of draw and swing bridges shall balance needs of land and water **traffic**. Commercial vessels and emergency road traffic shall have right-of-way over other **traffic**.

*Utilities and Infrastructure Recommendations: \**

- R-1. Railroad rights-of-way in and around the Delta should be protected as transportation corridors. Regional rail links between the Central Valley and the Bay Area should be developed for commuters as alternative transportation routes, thus removing traffic from Delta roadways.*
- R-2. Bridges provide critical links within the Delta. While bridges must be maintained to provide safe access across waterways, bridges should not be constructed so as to invite roadway expansion. Ferries should be maintained by public entities as long as they are economically viable. Public-private partnerships should be explored to offset costs of maintenance and operation. Hours of service may be curtailed and/or fees charged to non-residents.*
- R-3. The existing commercial shipping channels should be maintained, and if determined to be environmentally and economically appropriate, deepened to meet modern shipping needs. Expanded use of shallow draft vessels, such as barges, should be explored as a transportation alternative to highways. Material excavated from the shipping channels should, if feasible, be used for maintenance of Delta levees or for wildlife habitat enhancement within the Delta and for other uses within the Delta.*
- R-4. Materials dredged from Delta channels should, if feasible, be stored at upland sites for reuse for levee maintenance and repair, and other feasible uses in the Delta. Impacts to wildlife caused by storage of dredged materials should be mitigated.*
- R-5. CalTrans should designate, through appropriate signage, those roadways which are used to transport agricultural equipment and other slow-moving vehicles.*
- R-6. Potable water supplies to serve Delta uses can be obtained from surface waters or groundwater. Development of groundwater wells should be monitored to ensure wells do not result in overdraft and possible intrusion of saline water into groundwater supplies.*
- R-7. Natural gas production will continue to be an important use of Delta resources. Structures needed for gas extraction should be consolidated to minimize displacement of agriculture and wildlife habitat. In compliance with existing laws, facilities no longer needed for gas extraction should be completely removed to allow restoration of agriculture or wildlife habitat uses. Counties should ensure that there are appropriate buffers between gas processing and storage facilities and residential and recreational uses to protect lives and property.*
- R-8. Utilities should be required to contribute a fair share to the cost of levee maintenance and other local services and should not result in a reduction of assessable acreage for reclamation districts.*

*\*Recommendations Adopted by Delta Protection Commission on February 23, 1995.*

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